

Verification of the Origins of Rotation in Tornadoes Experiment 2 (VORTEX2): Opportunities for Warn-on-Forecast

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SCIENCE, SERVICE & STEWARDSHIP

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VORTEX2 Overview

Foci

- Tornado genesis, maintenance, and dissipation
- Near-ground winds in tornadoes
- Storm-environment relationships
- Numerical prediction of supercells and tornadoes

People

- 38 PIs, many of them involved in Warn-on-Forecast
- ~100 students involved in the field campaign, many of them now working on VORTEX2 research projects



VORTEX2 Overview

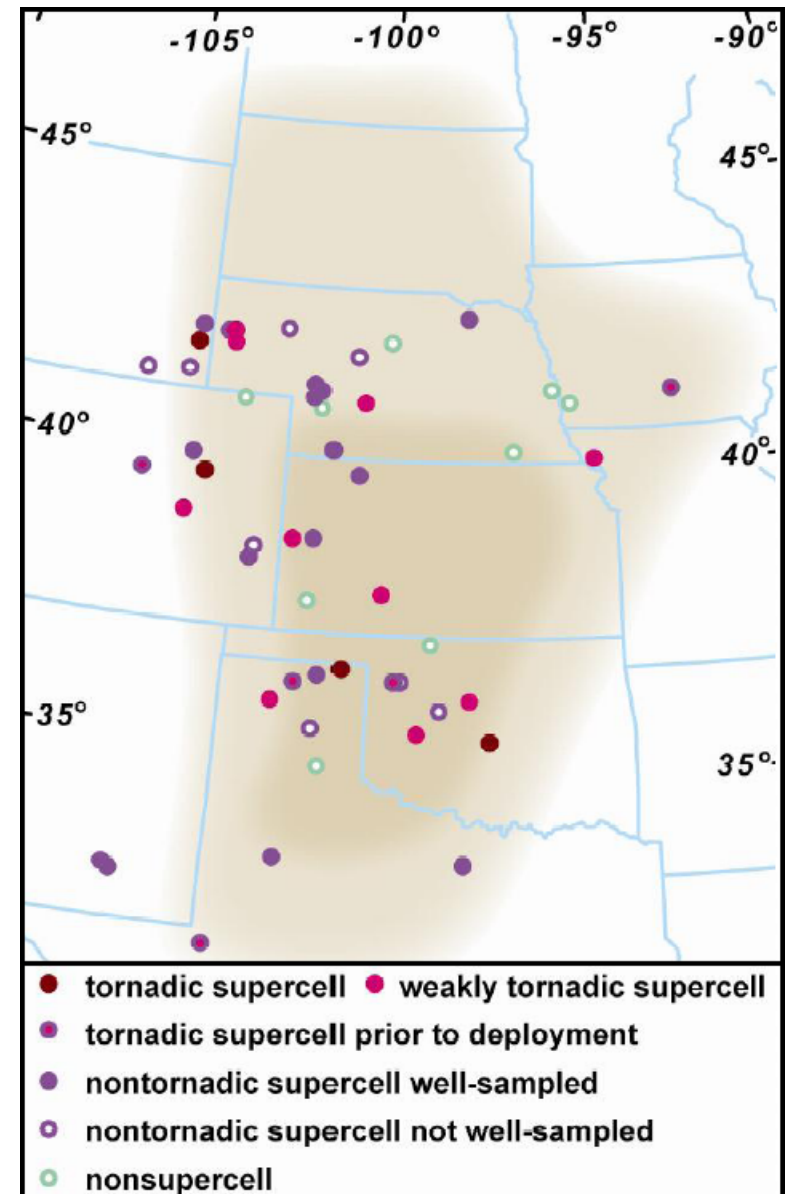
Instruments

- 11 mobile Doppler radars (C, X, K, and W bands)
- Surface observing systems: StickNet (24 probes), mobile mesonet, disdrometers, tornado probes
- 4 mobile sounding systems
- Photogrammetry cameras: storm- and tornado-scale
- Unmanned aerial system (limited operations in 2010)
- Central OK observing systems (MPAR, CASA, Mesonet, ...)



Summary of VORTEX2 Cases 2009-2010

- Significantly tornadic supercells
 - 2 cases well sampled
 - 5 June 2009 LaGrange, WY
 - 13 June 2010 Booker, TX
 - 2 cases partially sampled
 - 10 May 2010 Seminole, OK
 - 10 June 2010 Last Chance, CO



Summary of VORTEX2 intercepts.

- ~10 weakly tornadic supercells
- ~22 nontornadic supercells
- ~9 non-supercell storms

Data Availability

- Spring 2009 (raw) data already in public domain
- Spring 2010 (raw) data in public domain after Oct 2011
 - Some datasets available now through collaboration with PIs
- PIs eager to collaborate
 - Enough data were collected to keep us busy for the rest of our careers.
 - PIs are “cleaning up” data for their initial analyses and publications, and would like for these data to be used in subsequent studies.
 - expectation of co-authorship / acknowledgment
 - VORTEX2 science workshop early spring 2012

Unique VORTEX2 Datasets

- **Multi-scale radar observations**
 - Storm scale: WSR-88D network, mobile C-band radars
 - Mesocyclone scale: Mobile C- and X-band radars
 - Tornado scale: Mobile X-, K-, and W-band radars
- **Thermodynamic observations**
 - Soundings: storm environment, cold pools
 - StickNet and mobile mesonet: storm environment, cold pools
- **Precipitation-microphysics observations**
 - Polarimetric (X-band) radars
 - Disdrometers

Unique Opportunities with VORTEX2

- **Multi-scale radar observations**
 - Assimilate coarse-resolution radar observations into a high-resolution model, verify with high-resolution observations.
- **Thermodynamic observations**
 - Verify cold-pool forecasts.
 - Verify environmental profiles and storm-induced changes.
 - Could our forecasts be improved significantly if we assimilated such thermodynamic data?
- **Polarimetric (X band) and disdrometer observations**
 - Develop and test conceptual models for precipitation microphysics.
 - Quantify errors: q_r prediction, reflectivity observation operator.
- **Diverse approaches applied to common datasets**
 - We can learn more, and learn more quickly, if we are discussing common cases (“intercomparison”).